FRES’s model for decentralized energy access in Sub-Saharan Africa

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Introducing FRES

Mission
Provide electricity to rural, off-grid areas of developing countries, principally by use of solar energy.

Vision:
A multi-national network of local FRES companies throughout Sub-Saharan Africa.

What we do:
• Establish small scale utility companies
• Commercial, replicable & sustainable approach
• Focus on households & small enterprises (customers)
• Focus on productive use
Alliance for Rural Electrification (ARE)

- International business association representing the decentralised energy sector working towards the integration of renewables into rural electrification markets in developing and emerging countries.

- Enabling improved energy access through business development support for members along the whole value chain for off-grid technologies by targeted advocacy and facilitating access to international and regional funding.

- Global platform for sharing knowledge and best practices to provide for rapid implementation of available and advanced RE technologies and services.

→ www.ruralelec.org
Achievements to date 2001-2014

<table>
<thead>
<tr>
<th>Country</th>
<th>Customers</th>
<th>Direct Staff</th>
<th>Indirect Staff</th>
<th>Total Investments</th>
<th>Solar Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yeelen Ba, Burkina Faso</td>
<td>3,365</td>
<td>30</td>
<td>7</td>
<td>4,000,000</td>
<td>342 kWp</td>
</tr>
<tr>
<td>Yeelen Kura, Mali</td>
<td>6,314</td>
<td>54</td>
<td>18</td>
<td>10,222,000</td>
<td>902 kWp</td>
</tr>
<tr>
<td>FRES Uganda, Uganda</td>
<td>3,482</td>
<td>53</td>
<td>8</td>
<td>3,150,000</td>
<td>544 kWp</td>
</tr>
<tr>
<td>FRES Guiné-Bissau, Guinea-Bissau</td>
<td>2,041</td>
<td>6</td>
<td>42</td>
<td>2,044,000</td>
<td>279 kWp</td>
</tr>
<tr>
<td>NuRa, South Africa</td>
<td>18,065</td>
<td>96</td>
<td>23</td>
<td>20,306,000</td>
<td>1,317 kWp</td>
</tr>
</tbody>
</table>

**Total**

- Total customers: 33,267
- Total staff (direct): 239
- Total staff (indirect): 98
- Total investments: €39,965,000
- Total installed solar capacity: 3,384 kWp
FRES customer evolution (2001-2014)
Total installed solar capacity in kWp
FRES Business Model

Fee-for-service business model that is replicable and adaptable to new regions and countries:

- Commercial local FRES companies (small utilities)
- Capital investments financed by FRES (and partners)
- Fee for Service: €6-21/month for access to (solar) electricity
- Affordable and sustainable tariff structure to cover operational expenses and replacements (batteries etc)
- Utilities in charge of installation, maintenance
- Local staff employed in rural setting
Business phases for start-up

**Phase 1:** Pre-selection of countries based on:
- Market-potential research;
- Upon requests from governments or NGOs or local communities;

**Phase 2:** Desk research

**Phase 3:** Market research

**Phase 4:** Development of business plan

**Phase 5:** Search financiers

**Phase 6:** Implementation

**Phase 7:** Monitoring and adjusting
Technologies

Solar Home Systems
• System size: 80Wp/90Ah - 320Wp/300Ah
• Target market: households & small businesses in remote areas
• Customers: 29,000 in 5 countries (June 2015)

Mini-grids
• System size: 50kWp / 0.8 MWh (C10) – 150kWp / 2.5 MWh (C10)
• Target market: Densely populated rural villages with diverse economic activities
• 9 mini-grids operational in Mali (2 PV, 7 hybrid and 1 diesel-only)
• 4,000 mini-grid customers (June 2015)
Tariffs

- Balancing commercial and social drivers
  - Customer tariffs designed to be financially sustainable at scale
- Government regulation

**Solar Home Systems:**

- Monthly fee of €6 - €21 per month
- Several service levels available
- Payable in cash or via mobile banking

**Mini-grids:**

- Consumption-based fee of € 0.38/ kWh
- Pre-payment
- Tariffs include provision for public lighting
Case study: Yeelen Kura, Mali

Customers (June 2015): 5,746
Staff: 54
Energy stores: 16

- Established by Nuon and EDF in 2001
  - Since 2008: FRES 80% and staff trust fund 20%
- Customer growth largest in mini-grids
- Implementing partner of Ministry of Energy/AMADER
- Ongoing tariff negotiations with AMADER
- Ongoing grid network optimisation programme
Managing and planning for growth in demand

- 10 – 15% growth in demand annually
- High consumption during day
- Extended hours of operation
- Active demand side management

Electricity consumption per mini-grid customer 2006-2014
Success factors (1)

Business model:

- Commercial, sustainable and replicable approach
- Affordable and sustainable tariff structures
- Maintenance and replacement guarantees > 20 years
- Electricity beyond basic lighting (productive-use)
- Costs effectiveness based on low operational costs, centralised procurement policy and using components with a longer lifetime (regular studies on technology developments)

Strong governance model:

- Strict monitoring of performance of local companies (assessing on basis 4 business indicators)

Risks management:

- Policy for managing internal and external risks (very important: benchmarking)

Procurement policy:

- Centralised procurement policy, Gains from bulk purchasing, tendering strategy (good balance between technical score and price score, high quality components)
Success factors (2)

Local ownership:

• Local FRES companies responsible for full-cycle utility services
• Structural direct and indirect employment and ongoing training in rural setting
• Strong cooperation with / support from national governments, local authorities, community

Strong partnerships

• Financial: (mobilise subsidies, private sector donations and sponsoring, own capital)
  • Governments of The Netherlands, South Africa, Mali and Uganda
  • European Commission
  • World Bank
  • Private companies: Nuon, EDF, Alliander (grid network company)
  • Private Public Partnership (Nuon, Government of the Netherlands, FRES)
  • NGO’s (Stichting Doen, Hivos…)

• Technical:
  • Grid network company Alliander
  • GERES (Groupe Energies Renouvelables, Environnement et Solidarités)

• In kind support for organisational, legal, financial, fiscal advice from various companies:
  • PwC, Clifford Chance, Allen & Overy, Alliander, PUM…
Challenges and lessons learnt

Financial:

– Insufficient financing available for necessary scale-up
– Public support through co-financing grants and risks mitigation mechanisms still important
– Importance of SHS understated in global energy access mix (focus on mini-grids)

Operational:

– Tariff negotiations
– Non-payment (technology to combat non-payment)
– Managing growth in demand
– Qualified staff in rural setting
– Few energy efficiency appliances available in the markets

General:

– Greater transparency of national policies (such as grid extension)
– More efforts to mitigate risks related to regulatory, economical, fiscal, policy issues
Next steps

• New FRES company in Cameroon
• Mini-grid operations to start in Guinea-Bissau
• Continuous focus on financial sustainability of local companies
• Technical and economical mini-grid performance evaluation
Partners